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## THE CORRESPONDENCE OF OLBERS AND GAUSS.

*Wilhelm Olbers, sein Leben und seine Werke.* Im Auftrage der Nachkommen herausgegeben von Dr. C. Schilling. Zweiter Band, Briefwechsel zwischen Olbers und Gauss, Zweite Abtheilung. Pp. vi+758. (Berlin: J. Springer, 1909.) Price 16 marks.

TEN years have elapsed since the first part of this volume appeared (NATURE, vol. Ixi., p. 486), the editor having been prevented by other occupations from completing his work, until he secured the co-operation of Dr. Kramer. The present part (or rather volume) comprises the years from 1820 to the death of Olbers in 1840. Although it forms part of a publication intended to keep alive the memory of Olbers, the real hero of this volume is Gauss, not only because he was a greater man than his correspondent, but also because the scientific work of Olbers was almost finished before 1820. All the same, the volume serves to complete the picture of the charming personality of Olbers with which previously published letters had supplied us, while it almost forms a diary of the scientific work of Gauss during the years 1820-40.

At the beginning of 1820 the new transit circle by Reichenbach had just been mounted at the Göttingen Observatory, and Gauss was busy studying what was practically a new form of instrument. Though he was very fond of observing, the Göttingen Observatory did not accomplish as much as might have been expected, considering the devotion of the director to astronomy and the fine instruments at his disposal. This was partly caused by the various other pieces of work in practical science which occupied so much of his time, partly by his never having an assistant until the death of Harding (in 1834), who held a rather anomalous position. Geodetic work soon came to occupy most of Gauss's time. The continuation of the Danish survey southward through Hanover was finally decided on in 1820, and the work in the field was carried out during the summers of the next five years, most of it by Gauss himself, who, both on this and on the computation of the results, spent a vast amount of time. One cannot help regretting that so great a mathematician should have been obliged or found it necessary to do so much routine work himself instead of merely supervising its execution by others. No doubt this work gave rise to several theoretical investigations of great value, and occasioned the invention of the heliograph by Gauss, but these results would have been produced equally well by his brain if the fatiguing work in the field and the arithmetical drudgery at home had been done for him. Attempts were repeatedly made at Berlin, especially in 1824, to get a post created for Gauss in connection with the Academy of Sciences, but they were never successful. At Berlin he would have been relieved of all teaching work, which he greatly disliked, and his time would have been almost altogether his own. The work on the survey continued to drag

on; the present volume gives full details about the various stages of it, but everything of permanent interest has already been given in excerpts from these letters in Gauss's collected works.

During the second half of the period in question Gauss devoted himself chiefly to researches on terrestrial magnetism, and continued to keep Olbers posted on the progress of this work. Naturally the electromagnetic telegraph which was established in 1833 between the observatory, the Johannisturm, and the physical laboratory, a distance of several thousand yards, is described with pride and in full anticipation of the great possibilities of the invention. The cooperation of Gauss and Weber in the magnetic work came to an end in 1837, when Weber, as one of the seven professors who had protested against the King's violation of the constitution, had to leave Göttingen. In his letters, Gauss expresses himself with great caution about this unpleasant affair, because, as he says himself, it was not at all unlikely that letters were tampered with while they were on the way.

Though Olbers in his letters had no great investigations to describe to his friend, he had always something of interest to say about the current scientific events of the day. It is interesting to see him occasionally give his opinion about some of his contemporaries. Thus he considered W. Herschel "a good mathematical head, but too much wanting as regards scientific education, though his, so to say, natural mathematics generally guided him in the right direction." As to Schröter, Olbers thought that though Mädler had spoken rather too severely of him, he certainly had very exaggerated ideas as to what his telescopes could show, and believed that no one but Herschel could verify what he himself saw or imagined he saw.

As a sort of running commentary on the progress of astronomy, Olbers's letters are of great interest, but their value to most readers would have been much increased if the editors had been more liberal with footnotes giving references to astronomical literature. Thus, when Gauss sets forth his grave doubts as to the alleged fraud of d'Angos, it should have been stated that Gauss much later wrote a short paper on this subject, which was printed after his death; also that the researches of d'Arrest and Gyldén have rendered it at least extremely doubtful whether any fraud had been committed. Similarly, when Olbers assumes it to have been proved that Hell falsified his observations of the transit of Venus, it should have been pointed out that Newcomb most thoroughly established Hell's innocence. The nebula mentioned on p. 43 is N.G.C. 7293, and the mysterious nebula of Cacciatore (p. 461) is N.G.C. 6541, as to which J. Herschel showed long ago that Cacciatore had simply made a blunder in identifying a star (Gen. Cat., p. 37).

This correspondence fills two stout volumes in large octavo, 1500 pages in all. Is it really worth while to print every single word that a great man puts on paper? It is natural that a man should tell his intimate friend at some length that his wife and children have measles, or repeatedly give vent to his sorrow and indignation at the conduct of a good-for-nothing

son; but it goes without saying that he does not want all this printed. A judicious selection from these 734 letters would have been very much more valuable than this unsifted mass of important and unimportant matter. There is an excellent index, which will be of great use to a reader desirous of referring to any particular subject. In an appendix are given some letters about the negotiations to get Gauss an appointment at Berlin, and three very interesting letters from Bessel to Olbers from the year 1812, which have only recently been found.

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#### COLONIAL FRUIT-GROWING.

*Fruit-ranching in British Columbia.* By J. T. Bealby. Pp. viii + 196. (London: A. and C. Black, 1909.) Price 3s. 6d. net.

THIS is a practical work on the subject of fruit-growing in British Columbia, and we recommend it to any who have the intention of emigrating for the purpose of engaging in this healthful and interesting pursuit. But not to these alone, for the style in which it is written is sufficiently good to make the reading agreeable to the general public. It sets forth in plain but picturesque language the reasons that led the rancher to select British Columbia for the scene of his operations; it describes his journey out, relates the difficulties the new settler had to overcome, and proceeds to describe the measure of success that soon attended his labours.

This success enabled him, not only to win prizes for fruit at exhibitions in British Columbia and in the United States, but also to send excellent apples to the Royal Horticultural Society's shows in London, and gain for them the Society's gold medal!

The figures relating to the crops obtainable per acre in British Columbia are almost bewildering to the cultivator in this country, who can never be certain, even of a moderate return, until the danger of spring frosts is past at the end of May. The difference is explained by the sunnier skies, freedom from violent winds and storms, and the presence of a most fertile soil. The allurements these things offer are only to those who are content to undertake the hard work inseparable from colonisation. Unless the "tender-foot" possesses a sufficient capital to enable him to purchase an estate already planted, he must commence by clearing away the trees and under-shrub from his plot, and in this and all other work he must improvise ways and means for carrying out the details which are simple enough in a more thickly populated country, but very difficult in parts of a colony in the first stages of development.

In these matters the reader will find much interesting information in Mr. Bealby's work. He will realise how important it is that the work of preparing the ground shall be done in a thorough manner, and that careful consideration shall be given to the planting of suitable trees. The settler has to take into account the kinds of fruit most likely to yield profitable returns, and having decided thus far he must select the best varieties of each kind. He must study his market, the means that exist for sending the fruits to market, and the length of time they will be on transit.

The advice given on such matters as these is perfectly sound, and therefore calculated to assist settlers very materially, provided that instead of slavishly following them in detail they wisely modify them to suit best their own circumstances.

Mr. Bealby probably underestimates the cost of preparing the land, but this may be expected to vary in different districts, and he appears to place too much importance upon the fact that in the Kootenay and Okanagan districts the fruit plantations are more free from insect and fungal pests than in other localities. The explanation of this comparative immunity will probably be found in the newness of the land. Pests are seldom epidemic unless the host-plants are present in large numbers and so facilitate the spread of insects or fungi, but they usually appear when the cultivator has planted vast areas with the same kind of tree, or crowded them into a hot-house, as is the case with tomato and cucumber culture in our own country.

For this same reason, the best preventive is to plant thinly, allowing each tree as much isolation as can be spared with due regard to the yield per acre. It is satisfactory from this point of view to note that, so far as can be seen from the excellent illustrations contained in the book, it is not the practice to crowd the trees together in British Columbia. The trees depicted appear to have plenty of space around them, therefore they are exposed well on all their sides to the good influences of sunshine and air, which are conducive to healthy growth and a free cropping habit.

The evidence the book contains of the enormous help the settler in British Columbia may expect to receive from the Department of Agriculture and the British Columbia Fruit-Growers' Association should be an extra inducement to emigrants to select this country for their new home. We hope Mr. Bealby will return to the subject when he has gained further experience, for it has to be noted that he has only been engaged in the industry since 1907, a fact that may cause some to receive his recommendations with a certain amount of reserve, especially so far as they relate to yields, prices, and returns.

#### STEAM TABLES.

*Tables and Diagrams of the Thermal Properties of Saturated and Superheated Steam.* By L. S. Marks and H. N. Davis. Pp. 106. (London: Longmans, Green and Co., 1909.) Price 7s. 6d. net.

AN immense amount of painstaking work is represented by this little volume, which will, we think, be of undoubted use to all physicists and engineers who have to deal with problems involving the influence of heat upon water and steam. The two authors are connected respectively with the engineering and physical sides of the great American University of Harvard, and they have evidently formed a combination well suited for such an investigation as this. Until quite recently the only authoritative experiments over a considerable range of steam pressures and temperatures were those made by Regnault more than sixty years ago. We now have, however, the results of later experiments by Dieterici, Smith, Griffiths, Henning, Joly, Grindley, Peake,